


Spring 1996

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NSU Oceanographic Center

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Currents

Spring 1996 • Volume X, Number 2



Biological Study Focuses on Zooplankton Activity in Florida Bay

In late April, Ph.D. student **Carol Burkart** and M.S. student **Lee Houchin**, both studying under **Dr. Gary Kleppel**, set out to study the relative health of Florida Bay. Specifically, they measured zooplankton and microzooplankton activity in the bay waters. Led by **Dr. Carmelo Tomas**, of Florida's Department of Environmental Protection (DEP), they went out in small boats from Long Key, where the Keys Marine Laboratory is located.

In the zooplankton study, headed by Dr. Kleppel, Burkart took seawater samples at four stations, two of which were located close to the Florida mainland, and the other two located farther south in the bay. Her task was to determine egg production and hatching success at the various stations.

Copepod egg production was measured by procedures developed in the Center's plankton laboratory. In this experiment, Burkart incubated a specific number of female copepods from each of the stations, and then counted the number of eggs produced during the 24-hour incubation period.

"To determine the hatching success," Burkart explains, "the eggs are incubated for another 24 hours, and then both the eggs and the nauplii (hatchlings) are filtered out, preserved and counted. If all of the eggs have become nauplii, then the success rate is 100 percent. If eggs are still present, then the relative hatching success rate can be determined mathematically."

Houchin's task was to look at the impact of grazing by animals smaller

than adult copepods. Ultimately, by means of a dilution method, the amount of phytoplankton that these animals were eating at specified stations can be determined.

"In this procedure," Houchin explains, "the chlorophyll is extracted from the samples and placed in a fluorometer. Chlorophyll readings then give the specific growth rate of the algae. Once we get a growth rate for each dilution, I can plot it and do a mathematical regression analysis to get the microzooplankton grazing rate."

When asked about the health of Florida Bay, Houchin indicated that

the ecology of the bay has gone from a seagrass-dominated, clear-water system to a more turbid, plankton-dominated system. "We are actually finding that there is a lot of growth in the water. The microzooplankton seem to be eating small phytoplankton, and the copepods are eating the microzooplankton," she says.

Dr. Kleppel adds that, somewhat to his surprise, "the bay looks quite productive. Whether the trophic switch is good, or an indication of degradation, is not clear. Possibly it is normal that over time the system flip-flops between seagrass and plankton. We just don't know—yet."



Carol Burkart and Lee Houchin, with a map of Florida Bay.

People on the Move

In late March, **Dr. Julian McCreary**, Dean of the Oceanographic Center, ventured north. He visited two colleagues: **Dr. Paul Schopf**, at NASA/Goddard Space Flight Center in Greenbelt, Maryland, and former student **Dr. Zuojun Yu**, at the University of Maryland in College Park. He presented two seminars during his visit: "A Four-Component Ecosystem of Biological Activity in the Arabian Sea," and "On Source Waters of the Pacific Equatorial Undercurrent."

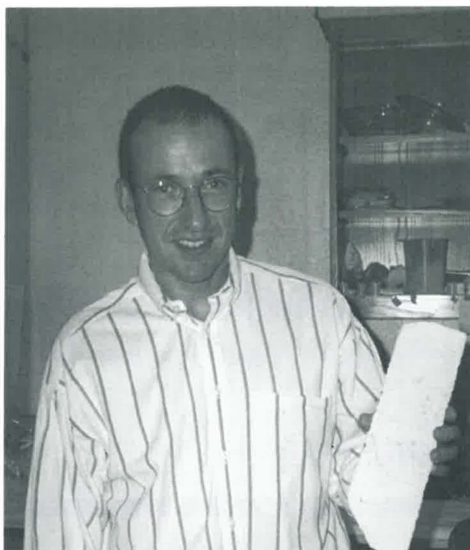
During the period April 15-23, **Dr. Charles Messing** hosted two French colleagues from the Department of Earth Sciences of the Université de Reims: **Dr. Michel Roux** and graduate student **Jerome David**. They were here to examine Dr. Messing's deep-sea crinoid collection.

Dr. Messing once again will spend the month of July in Paris. There he will continue his work on a deep-sea crinoid collection with **Dr. Nadia Cominardi**, curator of echinoderms at the Museum National d'Histoire Naturelle. The collection was made by a joint Indonesian-French experiment in Indonesia, called KARUBAR II.

In March, **Dr. Andrew Moore** attended a conference on the Data Assimilation and Model Evaluation Experiment in the North Atlantic, held at the University of Miami (RSMAS). He presented a talk entitled "Dynamics of Error Growth and Predictability in Models of the Gulf Stream." On April 23 he presented an informal seminar on the same topic at Harvard University, as well as a formal seminar entitled "Stochastic Forcing of Low-Frequency Variability in the Tropical Pacific." He gave the latter talk again at the Woods Hole Oceanographic Institution on April 25. In early May, Dr. Moore traveled to the University of Colorado in Boulder, where he presented the seminar again.

Dr. Richard Spieler and M.S. student **Robin Sherman** attended a conference in Key West, May 7-8. The conference was titled "Atlantic and Gulf States Marine Fisheries Commissions Joint Artificial Reef Meeting."

Dr. Richard Dodge and M.S. student **Daniel Anderegg** will attend the Eighth International Coral Reef Symposium in Panama City, Panama, June 24-29. Mr. Anderegg will present a talk entitled "Barium Chronologies from Two Southeast Florida Reef-Coral Species - An Index of Nutrient Enhancement." Dr. Dodge will present



Dan Anderegg, with a slab of Florida coral.

two posters: "The Effects of Oil and Oil Dispersants on Tropical Ecosystems: A 10 Year Update," co-authored by Center adjunct **Dr. Bart Baca** and others; and "Seasonal Extension, Density, Mass, and Calcification of *Montastraea faveolata*," co-authored by M.S. student **Kevin Helmle** and others.

David Gilliam, a Ph.D. student under **Dr. Richard Spieler**, also will attend the Coral Reef Symposium in Panama City. He will present a poster entitled "Juvenile Fish Recruitment on South Florida Reefs."

Along with Dr. Spieler, several of his students attended the American Society of Ichthyology and Herpetology 76th Annual Meeting in New Orleans, June 12-19. Among them, Mr. Gilliam and **Robin Sherman**, along with Dr. Spieler, presented a poster entitled "Fish Recruitment to Artificial Reefs in Shallow and Deep Water off Southeast Florida."

Cruise News

Ph.D. candidate **David Gilliam** and M.S. student **Brenda Hilkemann** participated in a NOAA-sponsored cruise aboard R/V *Pelican* during April and May. Hilkemann was aboard for Leg 1, from Key West to Jacksonville, Florida, and Gilliam worked during Leg 2 from Jacksonville to Beaufort, North Carolina. Both contributed to the shark genetic research of **Dr. Mahmood Shivji**. Hilkemann's tasks involved shark longlining: tagging and measuring species. Gilliam concentrated on collecting tissue samples.

Dr. Charles Messing was invited to participate in this year's JASON Project, organized by **Dr. Robert Ballard**, of the Woods Hole Oceanographic Institution. He was given the opportunity to make a dive on the Navy's nuclear research submarine, NR-1, off Key Largo. It was a 12-hour dive, from 7:00 p.m. on April 16 to 6:30 a.m. the next morning, to a maximum depth of 250 feet. Dr. Messing reported that "the night was spent using the Navy's sophisticated side-scan sonar to map a section of seafloor at the northern end of the Pourtales Terrace."



Dr. Julian McCreary and Dr. Zuojun Yu.

Center Seminars

The following seminars were held at the Oceanographic Center since the last issue of *Currents* was published.

March 27: "What Drives the Meridional Circulation of the Indian Ocean?" by **Dr. Jochem Marotzke**, of the Massachusetts Institute of Technology.

March 28: "A Mechanism for Decadal Climate Variability," by **Dr. Mojib Latif**, of the Max-Planck-Institut für Meteorologie, Hamburg, Germany.

May 3: "Vertical Eddy Mixing in the Tropical Upper Ocean," by **Dr. Zuojun Yu**, of the University of Maryland.

May 17: "Flying the Monsoons: Seasoar and Hydrographic Observations of the Arabian Sea Upper Ocean Physical and Biological Response to Monsoonal Forcing," by **Dr. Burton Jones**, of the University of Southern California.

Board Meets in April

The Oceanographic Center's Board of Governors met on April 18 at the Center. Board members present were **Betty Berry, Bud Brown, Will Connelly, Richard Donato, Denise Leibmann, Marshall Lytle II, John Peet, and John Penn.** Center faculty members present were **Drs. Richard Dodge, Julian McCreary, Charles Messing, and Mahmood Shivji.** Staff members **Helene Taylor** and **Jan Witte** also attended.

Dr. Dodge invited Board members to visit the newly completed foyer in the Forman Building, adjacent to the classroom. New doors, windows, and flooring have been added to the entire area. Dr. Messing described plans for the decor, which will include upholstered benches, underwater photos, and display cases housing shells, corals, dried marine life, and archaeological artifacts.

Mr. Connelly reported on his recent five-minute speech to the full U.S. Congress regarding the state of marine research, and the continued existence of NOAA.

Several possible development efforts were discussed. It was suggested that local yacht owners be introduced to *Currents*, in an attempt to attract donations for the Center. A number of boxes of note cards containing the Center's logo have been printed, with the help of Betty Berry, in an attempt to increase the Center's visibility. In this context, Dr. Messing brought up plans for another fund-raising cruise in June. He also noted that this year is the Center's 30th anniversary. Dr. McCreary suggested that we could host a scientific meeting, but at least a year's lead time would be necessary to get it organized.

Dr. Shivji suggested that we consider developing a large project to promote the Center, providing aquaria and marine displays. Dr. Messing further suggested displays of marine plants or large fiberglass models of marine creatures. Peet brought up the downside: the need for a considerable amount of work, commitment, and money—not to mention security, maintenance, and business support plans.

Rosana Mattioli Visits As Postdoctoral Fellow

Dr. Rosana Mattioli came to the Oceanographic Center in March to spend a year as a postdoctoral fellow working in **Dr. Richard Spieler's** laboratory. With a background in psychology and psychobiology, she has decided to explore the realm of fishes.

Dr. Mattioli received her Ph.D. degree in 1992 from the Universidade de Sao Paulo in Brazil, her native country. She subsequently spent a year and a half working at a psychology institute in Dusseldorf, Germany. It was at the institute that she learned of Dr. Spieler and his fish studies from a friend of his, and thus began the process that brought her to his laboratory. She currently is an adjunct professor at the Universidade Federal de Sao Carlos, which co-sponsored her visit in conjunction with Fundacao de Amparo à Pesquisa do Estado de Sao Paulo.

"I used to work with rats," she explains, "but then I switched to fish as a model to study behavior. It is a simpler model, because there are fewer structures in their brains in relation to higher vertebrates." As Dr. Mattioli describes her current experiment, she is "looking at neuropeptides and histamine blockers to see whether they enhance learning and memory" in fishes. With the help of M.S. student **Carrie Nelson**, she is searching for possible reinforcing effects of histamine blockers.



Dr. Rosana Mattioli, in her new office.

In another study, Dr. Mattioli is following the course of time that it takes fish that have suffered minor lesions of the brain to recover their sense of balance. In the laboratory, one group is injected with neuropeptides and a control group is not. In this way it can be determined whether the neuropeptides actually hasten the recovery process in the first group. She states that there has been some success with one particular neuropeptide, substance P.

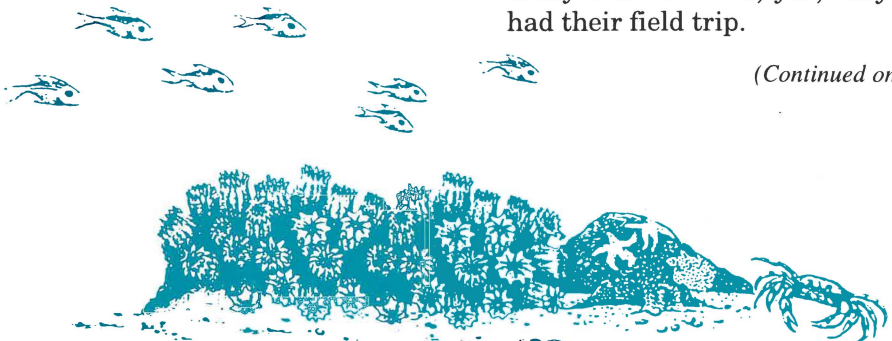
We all look forward to having Rosana with us for the remainder of her fellowship period.

"1996 Great Beautiful Palm Beaches Cleanup"

On April 13, the Dry Coastal Ecosystems class, led by Center adjunct **Dr. Bart Baca**, took part in a beach cleanup project at Gumbo Limbo Park. They had originally planned to tour the park as their first field trip, but they arrived to find a park staff desperate for cleanup volunteers.

After cleaning up the beach, the class of 16 were "psyched," according to Dr. Baca, so they demanded more work. They were promptly sent to the mangroves for some "disgusting trash removal—only one hypodermic needle and no bodies found." The group did receive a Certificate of Appreciation "for the enhancement of Palm Beach County's neighborhoods, roadways and shores," along with hats, coolers, and many thanks. And, yes, they finally had their field trip.

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New Reefs to Test Larval Fish Recruitment

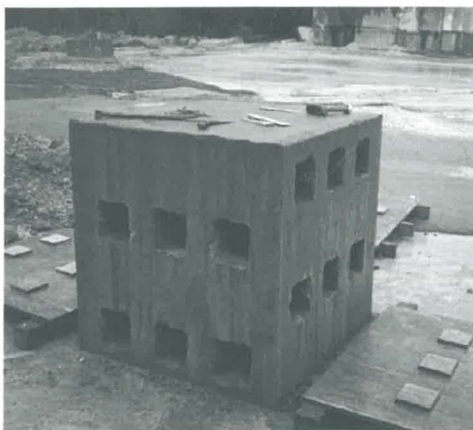
Dr. Richard Spieler and M.S. student **Robin Sherman** are set to test newly constructed artificial reefs, which will be sunk off Fort Lauderdale in early July. The concrete reefs will be monitored quarterly, with complete fish counts, for 18 months to two years. The object is to see what fishes will be attracted to a specific design, or if the design makes any difference at all to the fish.

There are three different module types. However, one has 12 six-inch square tunnels running through the concrete, all of which are a cubic meter in size; another has the same 12 tunnels, but they are three inches square; the third has 6 tunnels of each size. Ten reefs of each type will be placed at depths of 20 feet and 70 feet.

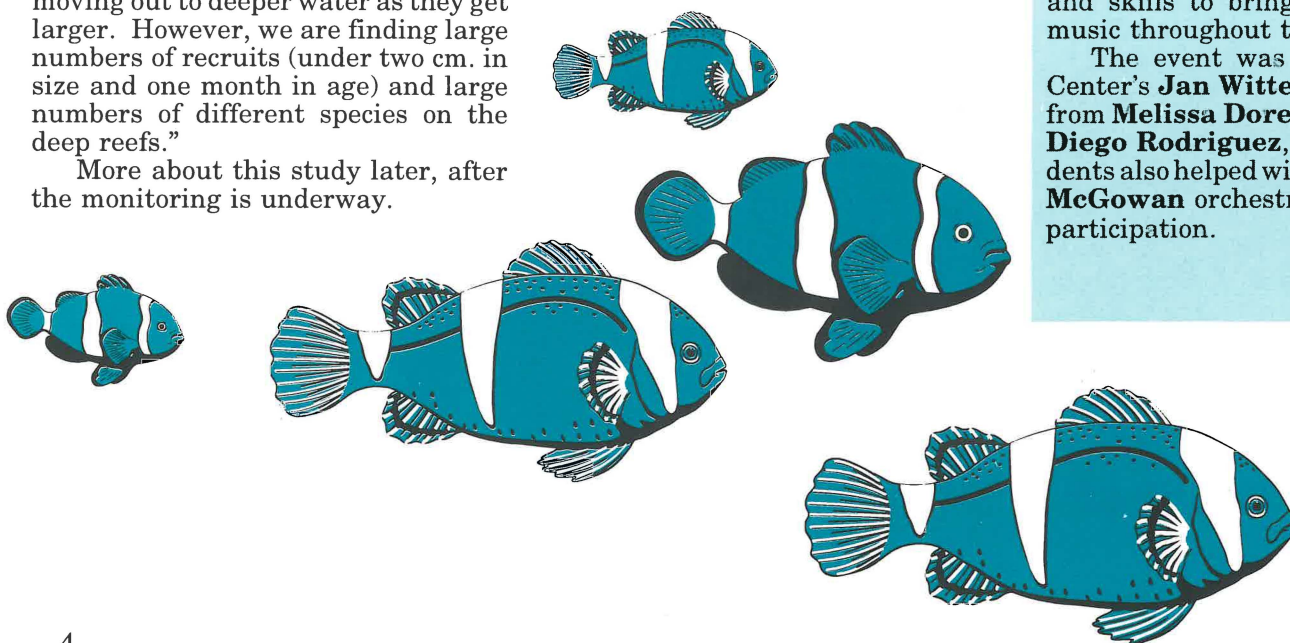
Dr. Spieler explains that "On the natural reefs, fishes use tunnels and the like for refuge. We are trying to see what role, if any, refuge size has in attracting and holding fishes at a reef." Ms. Sherman adds, "We want to determine whether the fish have a preference for large holes or small holes, and whether the fish that we record on the reefs are transients or residents. Damsel fish, for example, are very territorial, and might want to 'set up house-keeping' there."

"We also will look at new recruits - how many and what kind," she continues. "This is ultimately part of a much larger study about why fish recruit where they do, and how to optimize artificial reef design. Conventional wisdom has the recruits at mangrove forests and sea grass beds and then moving out to deeper water as they get larger. However, we are finding large numbers of recruits (under two cm. in size and one month in age) and large numbers of different species on the deep reefs."

More about this study later, after the monitoring is underway.



Robin Sherman with reef (above) as concrete is poured, and the finished product (below).



NSU/MIASF Barbecue Was a Treat

The Sixth annual Oceanographic Center/Marine Industries Association of South Florida (MIASF) barbecue was held at the Center on April 25. The good weather held, the tent stayed up, the band was in top form, and the food was very tasty.

Following the consumption of lots of ribs, chicken, corn on the cob, beans, salads, and assorted desserts, **John Penn**, of Lewis Marine and a member of the Center's Board of Governors, presented **Dr. Julian McCreary**, dean of the Oceanographic Center, with a check for \$1,000 on behalf of the MIAFSF. The money will be placed in the Bud Huch Scholarship Fund, to assist our M.S. and Ph.D. students. The crowd of over 200 then was treated to a brief talk by Fort Lauderdale's mayor, **Jim Naugle**. He told us a little local history, punctuated by the apt comment that all of South Florida's early settlers "came here by boat!"

The usual raffle closed out the evening, with the proceeds going toward student needs and local research projects. With the help of caller **Dr. Charles Messing** and a lot of other volunteers, we raffled off such great prizes as a USAir airline ticket to anywhere in the U.S., airboat rides, Jungle Queen Riverboat cruises, Discovery cruise tickets, casino boat cruises, meals at several local restaurants, and a signed Guy Harvey print, to name just a few. Special thanks go to Center Board of Governors member **Will Connolly**, whose band, the River Liffey Saloon Jazz Band, donated their time and skills to bring us fine stompin' music throughout the evening.

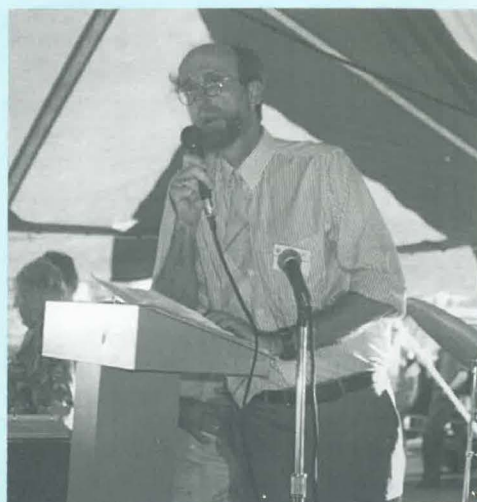
The event was organized by the Center's **Jan Witte**, with a lot of help from **Melissa Dore**. **Kathy Maxson**, **Diego Rodriguez**, and a host of students also helped with the setup. **Kitty McGowan** orchestrated the MIAFSF's participation.

(Continued on Page 5)

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Dr. Julian McCreary receives a scholarship check from John Penn, of MIA SF.



Dr. Richard Dodge welcomes the guests.



Mayor Jim Naugle addresses the crowd.



Will Connelly (center), and the River Liffey Saloon Jazz Band.



Dr. Charles Messing calls the raffle.



Part of the thirsty crowd at the barbecue.

UNDERCURRENTS

INSTITUTE OF MARINE AND COASTAL STUDIES

SUMMER TERM SCHEDULE

M.S. degree specialties are **Marine Biology** and **Coastal Zone Management**. Each course carries three credit hours or may be audited. Tuition is \$355 per credit hour (50% less for audit). Classes meet once a week from 6:30 to 9:30 p.m. at the Oceanographic Center. The summer term extends from July 1 through September 13, 1996. For further information, call **Helene Taylor** at (954) 920-1909.

Marine Chemistry (OCOR-5605): A CORE course. Reviews properties and composition of seawater; the importance, distribution, relationships, and cycling of major nutrients; dissolved gasses; trace metals; and organic compounds. Includes a self-paced laboratory. Problem-solving is supplemented by interactive microcomputer work. Prerequisite: undergraduate chemistry. Instructor: **Dr. Curtis Burney** (Center faculty). Begins Monday, July 1.

Coral Reef Ecology (OCMB-7012): Covers general ecology of corals and coral reefs. Includes discussions on the distribution, abundance, and physiology of corals, and the interactions among corals and between corals and reef-associated organisms. Effects from important natural and anthropogenic events are considered. Emphasis is on coral communities and coral reefs of the Caribbean and Florida Keys. Two Saturday field trips (snorkeling only) are required. Instructor: **Dr. Joshua Feingold** (Visiting Professor). Begins Tuesday, July 2.

Wetlands Ecology (CZMT-0791): Concentrates on the identification, delineation, assessment, functions, and ecology of marine and freshwater wetland habitats. Saturday field trips are planned to Everglades National Park, Loxahatchee National Wildlife Refuge, Jonathan Dickinson Park, and other area parks. Uses the same text as for Dry Coastal Ecosystems. Instructor: **Dr. Bart Baca** (Center adjunct). Begins Thursday, July 11.

Biological Effects and Risks of Chemicals in the Aquatic Environment (OCMB-6196): Covers biological effects and risks of foreign chemicals in aquatic ecosystems. Topics include bioavailability and fate in sediment water systems; uptake, metabolism, and accumulation in fish and invertebrates; and biodegradation in microorganisms. Sublethal behavioral and physiological effects, along with environmental legislation and risk assessment methods, are discussed. Presentations relate to acids, metals, detergents, pesticides, polychlorinated biphenyls, dibenzo-paradioxins, dibenzofurans, petroleum, hydrocarbons, radionuclides, nutrients, and other conventional pollutants. Instructor: **Dr. Gary Rand** (Center adjunct). Begins Friday, July 5.

Fall Term Schedule

The fall term extends from September 30 through December 20, 1996. Course descriptions will be published in the next issue of *Currents*.

Marine Ecosystems (OCOR-5602). A CORE course. Instructor: **Dr. Curtis Burney** (Center faculty). Begins Monday, September 30.

Functional Morphology and Physiology of Fish (OCMB-6220). Instructor: **Dr. Richard Spieler** (Center Faculty). Begins Tuesday, October 1.

Tropical Marine Fish Ecology (OCMB-6120). Instructor: **Dr. Richard Spieler** (Center faculty). Begins Tuesday, October 1 (5:00-6:30 p.m.).

Florida Environmental Regulations (CZMT-0621). Instructor: **Mr. Stacy Myers** (Center adjunct). Begins Wednesday, October 2.

Marine Mammals (OCMB-6330). Instructor: **Dr. Keith Ronald** (Center adjunct). Begins Thursday, October 10.

Fundamentals of Aquatic Ecotoxicology (CZMT-0650). Instructor: **Dr. Gary Rand** (Center adjunct). Begins Friday, October 4.

New Students for 1996

The following students have registered for the winter and spring terms in the Institute of Marine and Coastal Studies. Welcome aboard!

Greg Bonnett, MB: The American University

Bertrand Deher, MB: Florida Tech

Kristin Devine, MB: Rowan College

Dan Fahy, SP: Pennsylvania State University

Susan Formati, SP: University of West Florida

Sean Heiss, SP: Nova Southeastern University

Victor Hernandez, SP: University of South Florida

Shelly Kowalski, SP: Nova Southeastern University

Kristin Pelizza, MB: University of North Carolina

Stacie Perdue, SP: Pennsylvania State University

Dianne Petitjean, SP: University of Lausanne

Nicole Quint, SP: University of Missouri

Sheila Sexton, MB: Hunter College

Brian Sharpe, MB: Nova Southeastern University

Dean Shaver, SP: University of Alabama

Amy Woodhead, CZM: James Cook University

CZM: Coastal Zone Management

MB: Marine Biology

SP: Special Student



CONTRACTS AND GRANTS: UPDATE

Since the publication of the Spring 1995 issue of *Currents*, Center investigators have been awarded a number of contracts and grants by federal, state, and local funding agencies. These awards continue to serve as the lifeblood of the research arm of the Oceanographic Center.

- C. Burney:** "Sea Turtle Monitoring FY96," Broward County Commissioners (4/4/96-4/3/97). \$72,589.
- R. Dodge/C. Messing:** "Port Everglades Macroinvertebrate Study," Port Everglades Authority (8/1/95-7/31/96, year 5). \$36,611.
- R. Dodge:** "Algal Blooms in Coastal Waters: Using Corals to Differentiate Nutrients from Pollution or Natural Sources," Florida Sea Grant (5/4/95-1/31/96, year 2). \$67,950.
- R. Dodge:** "Analysis of Banded Reef Coral Skeletons to Provide Historical Information on Chemical Changes in Florida Bay," NSU (5/11/95-5/10/96). \$10,000.
- R. Dodge:** "Research, Training, and Production: Aquaculture Facility and Shrimp Hatchery," NSU (2/1/96-1/31/97). \$75,000.
- G. Kleppel:** "Secondary Production in Florida Bay," Florida Dept. of Environmental Protection (6/8/95-12/7/95). \$21,367.
- G. Kleppel:** "The State of Florida's Estuaries and Future Needs in Estuarine Research," State of Florida (10/1/95-9/30/96, year 2). \$6,550.
- B. Klinger:** "Dynamics of Three Dimensional Thermohaline Circulations," National Science Foundation (NSF) (8/1/95-7/31/96, year 1). \$100,000.
- J. McCreary:** "Dynamics of Ocean Circulation: Coastal Instabilities and Mid-Latitude Subduction," Office of Naval Research (10/1/95-8/28/96, year 3). \$100,860.
- J. McCreary:** "Meridional Circulation Cells and the Maintenance of Tropical-Ocean Thermal Structure," NSF (6/1/96-5/31/97, year 2). \$175,000.
- J. McCreary/J. Proehl:** "Dynamics of Tropical Instability Waves," NSF (11/1/95-10/31/96, year 2). \$76,100.

Students and Alumni on the Job

A recent report, submitted by **Tricia Phelan**, indicates that quite a few Coastal Studies M.S. students and alumni are currently associated with the Department of Environmental Resources Management (DERM), located in Miami. Here are their stories.

John Farina, Chief of the Compliance Section, has been at DERM for 20 years. He responds to citizen complaints, performs source inspections, conducts investigations, works on special projects, and responds to emergencies. He also is working on his M.S. thesis in Coastal Zone Management (CZM) at NSU.

Another "old-timer," **Craig Grossenbacher**, is DERM's Chief of the Coastal Restoration Section. His group develops regulations for sensitive areas and environmental restoration projects, and it inspects marine facilities for compliance with Dade County environmental regulations. He started in NSU's CZM program in 1985; his 1987 M.S. thesis work was on the release of nitrogen in red, white, and black mangrove species during decomposition.

Ken Liddell currently is a Biologist I in Coastal Restoration. He issues permits for coastal construction projects in Biscayne Bay and on Miami Beach. He is responsible for biological assessments to assure mangrove, seagrass, and manatee protection. He is also working on his M.S. degree in the

J. McCreary/J. Witte: "Editorship of the *Journal of Physical Oceanography*," American Meteorological Society (7/1/95-6/30/96, year 1). \$35,800.

C. Messing: "Environmental and Taxonomic Control of Growth, Morphology, Taphonomy, and Sediment Production in Living Stalked Crinoids (Echinodermata)," NSF (9/1/96-8/31/98). \$49,786.

A. Moore: "A Study of the Dynamics of Error Growth and Predictability in Models of the Gulf Stream," NSF (9/1/95-8/31/96, year 1). \$80,000.

R. Spieler: "Artificial Reef Study," Department of Natural Resources (4/15/96-12/31/96). \$63,000.

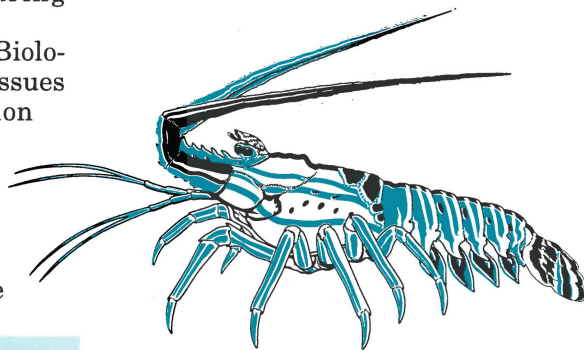
dual Marine Biology and CZM program.

Keven Mayo has worked in DERM's Restoration and Enhancement Section for six years, and has recently developed a manatee protection program. Keven is in the process of writing a M.S. thesis in the area of CZM.

Wendy Sotera is a Pollution Control Inspector I in the Compliance Section, investigating environmental complaints. Her work involves researching site histories, site assessments, owner notifications, and compliance follow-up. Wendy has been in NSU's CZM program since 1994.

Sarah Suggs also is a Pollution Control Inspector I. Her job is to investigate public environmental complaints, inspect facilities for compliance, and respond to environmental emergencies. Sarah hopes to complete the M.S. degree in CZM by this time next summer.

Bill Tiemann works in the Planning and Evaluation Section, performing water quality monitoring in Dade County. At present he is monitoring a well field as well as the ground and surface waters of a canal. Bill received the M.S. degree in Oceanography from NSU in 1991.



Ph.D. Degree Offered

The Oceanographic Center offers the Ph.D. degree in Oceanography. The program requires a minimum of 60 credits beyond the baccalaureate, 30 of which may be applied from the master's program. The remaining credits are made up of at least 24 dissertation research credits and 6 credits from upper-level course work, usually taught in the tutorial mode. Tuition is \$2,360 per quarter.

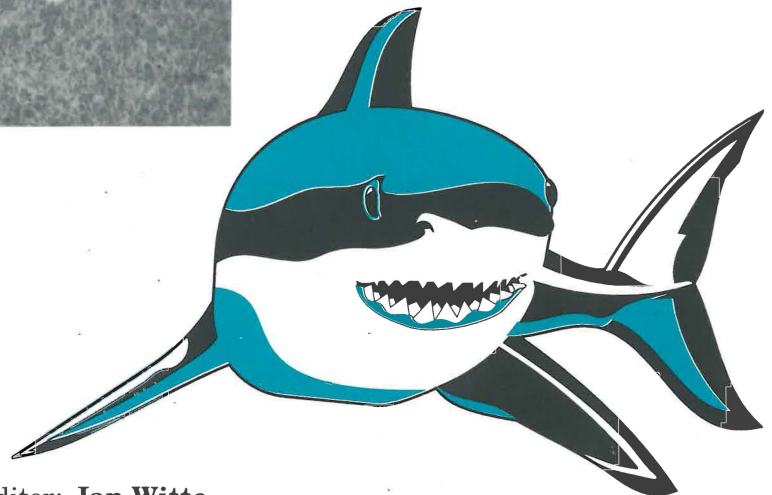
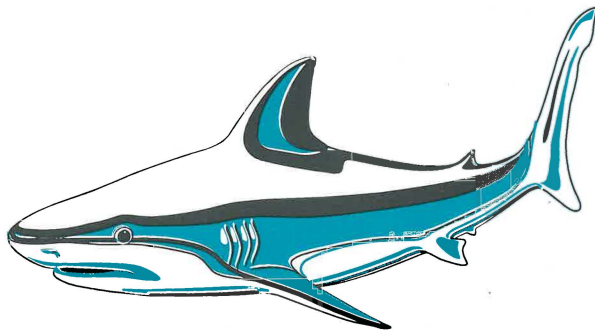
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*Dr. Bart Baca (second from left)
and his class at Gumbo Limbo Park.*



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**Recycled
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